

2.4GHz RF Modular Transceiver System Installation manual (draft v1)

1. Description

This document describes an RF transceiver module PCB having two independent radio transceivers. One radio complies to IEEE 802.11b/g protocols and the other to the Bluetooth Low Energy specification. The module provided on-board power regulation and full shielding for the radio transceivers.

2.

The module consists of 2 separate circuits :

- 1) A 2.4GHz Wi-Fi RF transceiver IC and two PIF etch antennas.
- 2) A 2.4GHz Bluetooth Low Energy transceiver IC and one PIF etch antennas.

3. Cautions:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by Bose Corporation could void the user's authority to operate this equipment.

WARNING! This module is to be installed only by Bose Corporation in its end products, and shall not be marketed to any other party.

This RF Module has been certified for integration into products without further certification. However, Bose Corporation is still responsible for testing its end products for any additional compliance requirements required with this module installed (such as digital device emissions, PC peripheral requirements, etc.).

End Product Labeling

This module is labeled with its own FCC ID and IC Certification Number. If the label is not visible when the module is installed inside another device, then the outside of the device into which this module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

“Contains Transmitter Module FCC ID: A94412568”

“Contains Transmitter Module IC: 3232A-412568”

or

“Contains FCC ID: A94412568”

“Contains IC: 3232A-412568”

IMPORTANT NOTE: In the event that these conditions can not be met (for certain configurations or collocation with another transmitter), then the FCC and Industry Canada authorizations are no longer considered valid and the FCC ID and IC Certification Number can not be used on the final product. In that case the end product must be re-evaluated to obtain separate FCC and Industry Canada authorizations.

In addition, Information regarding how to install or remove this RF module or change its RF related parameters should not be provided to the end user.

The user manual for the end product must include the following information in a prominent location:

“To comply with FCC and Industry Canada RF radiation exposure limits for general population/uncontrolled exposure, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times. In addition this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter.”

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur)

approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

4. Markings

4.1 This module shall be identified with the following ID numbers on the radio shields.

FCC ID : A94412568
IC : 3232A-412568

4.2 End Product Labeling

The final end product which this module is used in must be labeled in a visible area with the following:

"Contains FCC ID: A94412568 / IC:3232A-412568"

5. Connections

The following tables describe the connections to the module made via the four connectors.

J1201 Pin #	Group Name	Signal Name
31	Ethernet	GND
30	Ethernet	TXP
29	Ethernet	TXN
28	Ethernet	LCMT
27	Ethernet	RXP
26	Ethernet	RXN
25	Ethernet	GND
24	Ethernet	(+)3.3V_ET
23	Ethernet	SPD_LED_AN
22	Ethernet	SPD_LED_CA
21	Ethernet	LKACT_LED_AN
20	Ethernet	LKACT_LED_CA
19	USB	USB0_5V_FAULT_L
18	USB	MICROB_DET
17	USB	MICROB_SEL
16	USB	USB0_DRVVBUS
15	USB	USB0_ID
14	USB	GND
13	USB	USB0_DM
12	USB	USB0_DP
11	USB	GND
10	USB	USB0_VBUS
9	USB	USB0_VBUS
8	USB	GND
7	AUX/TAP	AUX_LEFT
6	AUX/TAP	AUX_RETURN
5	AUX/TAP	AUX_RIGHT
4	AUX/TAP	GND
3	AUX/TAP	TAP_IN
2	AUX/TAP	TAP_OUT
1	AUX/TAP	GND

J1200 Pin #	Group Name	Signal Name
10	Ground	GND
9	Button	STROBE0
8	Button	STROBE1
7	Button	STROBE2
6	Button	SWITCHIN0
5	Button	SWITCHIN1
4	Button	SWITCHIN2
3	Ground	GND
2	Button Sense	STATICIN
1	Ground	GND

J1203 Pin #	Group Name	Signal Name
1	Audio Out	AIC3256LRET\BASE
2	Audio Out	AIC3256LOUT
3	Audio Out	AIC3256RRET
4	Audio Out	AIC3256ROUT
5	Audio Out	EXTDACLRET
6	Audio Out	EXTDACLOUT
7	Audio Out	EXTDACRRET
8	Audio Out	EXTDACROUT
9	Audio Control	MUTEOUTN
10	Audio Control	AMPSTBYN
11	Audio Control	AMPFAULTN
12	Audio Control	AUDOUTBCLK (R1200)
13	SMPS, PA sync	GND
14	SMPS, PA sync	AUDIO_SYNC_OUT (R1208)
15	Monitor Inputs	IDIN
16	Monitor Inputs	PAOFFSET1
17	Monitor Inputs	PAOFFSET2
18	Monitor Inputs	PWRMON
19	Monitor Inputs	THERMISTOR
20	Audio Power	+5VA
21	Smartspeaker	UART0_RXD/IR_IN_T
22	GND	GND
23	Smartspeaker	UART0_TXD
24	User Interface	LED0
25	User Interface	LED1
26	GND	GND
27	Misc	I2C0_SCL
28	GND	GND
29	Misc	I2C0_SDA
30	Misc	STATICIN
31	Misc	BATT_CHG_EN_L
32	Misc	DC_PRESENT_L
33	Power	PGND
34	Power	PPOS
35	Power	PGND
36	Power	PPOS
37	Power	PGND
38	Power	PPOS
39	Power	PGND
40	Power	PPOS

7.2 2.4GHz 802.11b/g RF Transceiver

The transceiver uses a proprietary and confidential chip set from SMSC corporation for control and implementation of the IEEE 802.11b/g radio. A DM870 control chip implements the transmission protocol and feeds I-Q information to the company's T6201C RF transceiver. For transmit, the RF path includes a power amplifier SST12LP15A from Microchip.

The module shall use the following settings:

- 7.2.1 RF output power: +11dBm typical (measured at CON4)
- 7.2.2 Useable frequency range: 2412 – 2462MHz (Western Hemisphere)
- 7.2.3 Modulation: OFDM
- 7.2.4 Channel spacing: 5 MHz

7.3 Antenna Specification

The RF module uses three Planar Inverted F etch antennas, two in switched diversity mode for Wi-Fi and one for Bluetooth Low Energy. The PCB layout capture below shows their relative locations. The overall board dimensions are 225mm long by 37mm wide.

BTLE antenna

Wi-Fi antennas

